DOCUMENT RESUME

ED 243 432 IR 011 041

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TITLE Computer-Assisted Instruction and Continuing Motivation.
PUB DATE Jan 84
NOTE 12p.; Paper presented at the Annual Meeting of the Association for Educational Communications and Technology (Dallas, TX, January 20-24, 1984). For proceedings, see IR 011 020.
PUB TYPE Reports - Research/Technical (143) -- Speeches/Conference Papers (150)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS Analysis of Variance; *Computer Assisted Instruction; *Difficulty Level; Elementary Education; *Feedback; Grade 6; Intermediate Grades; Reinforcement; *Sex Differences; *Student Attitudes; Student Interests; *Student Motivation

ABSTRACT

Effects of two feedback conditions--comment and no comment--on the motivation of sixth grade students to continue with computer assisted instruction (CAI) were investigated, and results for boys and for girls were compared. Subjects were 62 students--29 boys and 33 girls--from a suburban elementary school who were randomly assigned to the comment and no comment treatment groups. All students completed the same CAI unit on flow chart symbols and received knowledge of correct results personalized with their names during the three practices in the unit. The comment treatment group was also given one positive comment related to competence after each practice and in the middle of the third practice. Subjects who chose the computer for the next task were judged as showing continuing motivation. Questionnaires were used to collect data on other factors related to continuing motivation such as competence, interests, and task difficulty. Results indicated a strong relationship between student attitudes and return to task. Significant attitude factors included students' perception of their performance, interest level of the task, attitude toward computers, perceived task difficulty, and desire to know their performance in relation to others; use of the computer itself also seemed to be a strongly motivational factor. No significant relationship with return-to-task rate was obtained for comment and sex of subject. Twenty-two references are listed. (LMM)

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COMPUTER-ASSISTED INSTRUCTION AND CONTINUING MOTIVATION

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Paper presented at the annual meeting of the Association for Educational Communications and Technology, Dallas, January 1984.

IR011041

INTRODUCTION

With the addition of microcomputers into the schools at all levels, computer-assisted instruction (CAI) is being integrated rapidly into the curriculum. Although many students initially are enthusiastic about computers, their continual interest and motivation (ie., continuing motivation) to work with CAI have not been investigated. (Swenson & Anderson, 1982). CAI, however, has been found to reduce instructional time by as much as one-half with no decrease in performance (Dence, 1980; Kulik, Kulik, & Cohen, 1980). Thus, a student's willingness to return to a computer-related task may be as important an outcome as improved performance.

Feedback in CAI has been found to improve student performance as measured by pre- and posttest data. Both relevant, informational feedback and feedback contingent on student performance have resulted in higher performance (Magidson, 1977; Tait, Hartley, & Anderson, 1974). In another study, Anandam, Eisel, and Kotler (1980) reported that students receiving personalized feedback wrote better essays.

Although feedback in CAI and motivation to return to task have not been investigated, evidence from related areas suggests that encouraging comments or praise can influence motivation. In a review of the literature on teacher praise, Brophy (1981) reported that praise should be individualized and should refer to the student's performance on the task in order to be effective. From research in the area of intrinsic motivation, positive comments given in a one-to-one situation led to increased motivation with kindergarten children (Anderson, Manoogian, & Reznick, 1976), fourth graders (Sarafino & Stinger, 1981), and high school students (Harackiewicz, 1979). Comments referring to a student's increased competence at a task also appear to be related to increased motivation. Both elementary and college level students have returned to task at a greater rate as they have felt more competent on the initial task (Arnold, 1976; Boggiano & Ruble, 1979).

There is some evidence that both comments and CAI may have a differential effect based on sex of subject. Males who received positive comments returned to task more frequently compared to males who did not, whereas the opposite occurred with females (Deci, 1971, 1972). Boys and girls also seem to choose different computer-related tasks (Swigger, Campbell, & Swigger, 1983).

Task difficulty, interest, and task enjoyment are other factors which

appear to influence continuing motivation. Harter (1975) has found that boys appear to have a greater desire than girls to solve challenging problems, while girls have a greater need for social approval. However, neither boys nor girls will select tasks they think are too difficult (Harter, 1978). In addition, interest and task enjoyment were found to be related to continuing motivation in a study with fifth graders (Mosley, 1983).

The present study was designed to investigate the effects of two feedback conditions on the motivation of boys and girls to continue with computer-assisted instruction. Two comment conditions (comment, no comment) were crossed with sex of subject. As is common in motivation research, subjects who chose the computer for the next task were judged as showing continuing motivation. Questionnaires were used to collect data on other factors related to continuing motivation such as competence, interests, and task difficulty.

METHOD

Subjects

Sixty-two (62) sixth-grade students, 29 boys and 33 girls, from a suburban elementary school participated in the study. The school was in a middle class socioeconomic area. Students were familiar with the operation of the school microcomputers.

Procedures

Trained experimenters administered the study in the school computer lab. Fourteen Atari 800 microcomputers on a networking system were used. Subjects completed a questionnaire and pretest before beginning a CAI unit. They worked on the unit at their own rate. As subjects finished, they were given the posttest and second questionnaire.

Six sessions were conducted, each lasting approximately 30-35 minutes. Students within each of three classes were assigned randomly to one of two treatment groups: comment or no comment. Only one treatment was administered during each session. All subjects completed the same CAI unit on flow chart symbols. They also received knowledge of correct results personalized with

their names during the three practices in the unit. In addition, the comment treatment group was given one positive comment related to competence after each practice. A comment also was inserted in the middle of the third practice.

The comments were

1) Good job, (Name of student), you are doing better than many of the other students.
2) (Name), you are getting better at identifying flow chart symbols. Keep up the good work.
3) (Name), many students can't do these problems so you are doing very well.
4) (Name), congratulations. You did better than most other students.

Materials

The unit on flow chart symbols was adapted for the computer from materials previously tried out with fourth- through eighth-grade students. The unit covers six flow chart symbols and their functions: oval, rectangle, diamond, parallelogram, flowline, and bracket. The unit included introduction, objectives and information, examples, practice, and feedback for each symbol. There were three practice activities, one after every two symbols. Items about previously learned symbols also were included in subsequent practices. For each item, students typed a single letter answer.

The experimenters programmed the unit for the Atari using PILOT. One diskette was created for each treatment. The diskette for the comment treatment group included the unit and the four positive comments. The diskette for the no comment treatment group contained only the unit.

Pre- and posttests with questionnaires were developed to assess students' performance and attitudes. Both the pretest and the posttest contained items about the purpose and use of flow chart symbols. The pretest had seven items while the posttest had ten. The first questionnaire consisted of six items related to students' attitudes toward the computer and experiences with it. On the second questionnaire, students responded to seven items about their perceptions of the CAI unit and their competence.

Data Sources

The frequency of subjects selecting the computer rather than paper and pencil as the medium for the next flow chart lesson served as the indicator of continuing motivation. As is the standard practice in this research area, return to the similar activity (in this case, the computer) indicates continuing motivation. Pre- and posttests measured student performance. The two questionnaires provided data on student interest and judgments about the unit and computers.

Design and Data Analysis

A 2 (comment) by 2 (sex of subject) completely crossed factorial design was used. The frequency of subjects choosing to return to a computer task was with an analysis of variance.

RESULTS

Analysis of variance of the proportion of subjects returning to task by treatment and sex of subject yielded no significant differences. Twenty-five of 29 boys and 29 of 33 girls returned to task. Return rates were similar for subjects in the comment (26/32) and no comment (28/30) groups. No significant differences occurred by treatment and sex of subject for posttest scores. The mean score on the ten-item posttest was 5.6, while the mean pretest score was zero.

Posttest questionnaire responses related to subjects' interest in the tasks and perceptions of how well they did were examined for their relationships to return to task. Separate analyses of variances indicated significant differences for five items. The frequencies of subjects returning to task by questionnaire responses are shown in Table 1. The relationships between student attitudes as indicated by the statistically significant questionnaire items and return to task can be seen in the percent returns in Table 1. As the response choice became less positive, return rates dropped. For those who selected the most positive response, from 94% to 100% of the students returned to task. In contrast, for the least positive response, only one subject returned to task on the first item and none (that is, 0%) returned for each of the other four items.

Table 1

Frequency of Return by Student Attitude Responses

Posttest Questionnaire Item	Responses			
	Very Well	Well	Badly	Very Badly
1. I think I did *	15-0[1] (100%)	32-5 (86%)	6-1 (86%)	1-1 (50%)
	Very Interesting	Interesting	Very Boring	Boring
2. This lesson was **	17-1 (94%)	33-0 (100%)	4-3 (57%)	0-4 (0%)
	Very Much	Some	Very Little	Not At All
3. I liked learning on the computer **	26-0 (100%)	28-3 (90%)	0-2 (0%)	0-2 (0%)
	Too Easy	Easy	Hard	Too Hard
4. This lesson was **	4-0 (100%)	30-3 (91%)	20-1 (95%)	0-4 (0%)
	Always	Often	Sometimes	Never
5. I would like to know ... compared to others **	18-1 (95%)	20-2 (91%)	16-1 (94%)	0-3 (0%)

* $p<.03$

** $p<.0001$

[1] The two numbers shown are the number of students who returned and who did not return. For example, of the students selecting very well in item 1, 15 returned (100%) and 0 did not return.

Examination of the data for the item "I think I did" reveals that all subjects who thought they had done very well returned to the computer (15/15) while others returned at lower frequencies (32/37, 6/7, 1/2). Analysis of variance yielded a significant difference, $F(3,55) = 3.35$, $p < .03$. Also significantly related to return rate were subjects' interest in the lesson, $F(3,55) = 29.49$, $p < .0001$ and how much they liked learning it on the computer, $F(3,58) = 30.38$, $p < .0001$. Seventeen of 18 subjects who thought the lesson was very interesting and all who thought it interesting (33/33) returned to the computer, while three of seven who thought it boring and none who thought it very boring returned (0/4). Similarly, all subjects (26/26) who very much liked to learn on the computer and 28 of 31 who liked it some returned. No one who liked learning on the computer very little or not at all returned to task (0/2, 0/3).

Subjects' perception of task difficulty was related significantly to rate of return, $F(3,58) = 17.28$, $p < .0001$. None of those who thought the lesson was too hard returned (0/4). Most others who rated it from too easy to hard returned (4/4, 30/33, and 20/21). Eighteen of 19 subjects who always wanted to know how they did compared to others returned to task, while none returned who never wanted to know how they compared (0/3). These responses were found to be significantly related to return, $F(3,57) = 12.76$, $p < .0001$.

It is clear from the data that a very high percentage of all subjects in the study returned to the computer task. This was true for 54 of 62 subjects or 87%. Although only eight subjects did not return, statistically significant patterns occurred in the questionnaire response but not with the experimental variables.

DISCUSSION

The present study was conducted to investigate the effects of positive comments related to competence on the continuing motivation of boys and girls doing a CAI lesson. The relationship of questionnaire responses to continuing motivation also was examined. Results indicated a strong relationship between student attitudes and return to task. Significant attitude factors included students' perception of their performance, interest level of the task, attitude toward computers, perceived task difficulty, and desire to know how they did compared to others. Data also suggest that the use of the computer

itself may be a strongly motivational factor. However, no significant relationship with return to task was obtained for comment and sex of subject.

That significant results were obtained for several attitude and task related variables was not surprising. One factor that some researchers have found to be important in continuing motivation is a student's feeling of competence (Boggiano & Ruble, 1979; Deci, 1975; Enzle & Ross, 1978). Student responses to the statement "I think I did...very well, etc." can be interpreted as indicating perception of their own competence on the task. The item, "I would like to know how well I did compared to others" also is related to perception of competence and was found to be significantly related to return. Similarly, task difficulty has been identified in several studies as an important factor in continuing motivation (ie., "this lesson was too easy--too hard"). In a graded situation, students will choose a task which is not too hard for them (Harter, 1978). Similar results were obtained in this study such that only students who rated the task "too hard" did not return. The significant relationship occurring between interest in the task and return seldom has been investigated. Story (Note 1), however, has found an interest in the task to be significantly related to return rate.

Both the overall return-to-task rate and responses to the item "I liked learning on the computer" indicated that the microcomputer itself may be an important factor in motivating students to return to task. Although this study was not designed to investigate experimentally the motivational effect of the computer, results indicate that it may have been the major factor. The overall return-to-task rate of 87% was far higher than the 50%-60% rates of other continuing motivation studies (Hughes, 1982; Mosley, 1983). It seems likely that this higher return rate may have been a result of, in a large part, the desire to continue working on the microcomputer. If this is the case, it is of particular interest because relatively little research has been conducted on the motivational value of the computer, per se.

The lack of a significant effect for comments on return to task may have been due to any of several factors. Other researchers (Danner & Lonky, 1981; Deci, 1971; Harackiewicz, 1979) have found that increased return rates occurred when students were given several comments during one task. Similar results may not have occurred in this study because of the depersonalized nature of the computer-delivered comments. In addition, the brief nature of a single task and the relatively short time period may not have been powerful

enough to establish a behavior pattern in students. While we like to think comments influence student motivation, a greater number of more personalized comments over a longer period may be required. Finally, the overall high return rates for both the comment and no comment groups, possibly associated with a motivational effect from use of the computer, left little room for comments to have an important effect on return rates.

Results of the present study suggest certain promising directions for further research. One such area relates to use of the computer itself. Research designed to investigate experimentally the effects on continuing motivation of computer-based tasks as contrasted to paper/pencil tasks, etc., would provide needed insight into the motivational value of microcomputers. Investigations which looked at personalized comments over longer time might yield additional information on effects of comments. Questionnaire data suggests that working with variables such as competence, interest in task, and task difficulty levels also could result in useful information. Further investigation of continuing motivation with variables such as these would better enable us to understand methods to help motivate students in the classroom.

Reference Note

1. Story, N.O. (1984). Factors influencing continuing motivation. Unpublished manuscript.

References

Anandam, K., Eisel, E., & Kotler, L. Effectiveness of a computer-based feedback system for writing. Journal of Computer-Based Instruction, 1980, 6, 125-133.

Anderson, R., Manoogian, S.T., & Reznick, J.S. The undermining and enhancing of intrinsic motivation in preschool children. Journal of Personality and Social Psychology, 1976, 34, 915-922.

Arnold, H.J. Effects of performance feedback and extrinsic reward upon high intrinsic motivation. Organizational Behavior and Social Psychology, 1976, 17, 275-288.

Boggiano, A.K., & Ruble D.N. Competence and the overjustification effect: A developmental study. Journal of Personality and Social Psychology, 1979, 37, 1462-1468.

Brophy, J. Teacher Praise: A functional analysis. Review of Educational Research, 1981, 51, 5-32.

Danner, F.W., & Lonky, E. A cognitive-developmental approach to the effects of rewards on intrinsic motivation. Child Development, 1981, 52, 1043-1052.

Deci, E.L. Effects of externally mediated rewards on intrinsic motivation. Journal of Personality and Social Psychology, 1971, 18, 105-115.

Deci, E.L. The effects of contingent and noncontingent rewards and controls on intrinsic motivation. Organizational Behavior and Human Performance, 1972, 8, 217-229.

Deci, E.L. Intrinsic motivation. New York: Plenum Press, 1975.

Dence, M. Toward defining the role of CAI: A review. Educational Technology, 1980, 50-54.

Enzle, M.E., & Ross, J.M. Increasing and decreasing intrinsic interest with contingent rewards: A test of cognitive evaluation theory. Journal of Experimental Social Psychology, 1978, 14, 588-597.

Harackiewicz, J.M. The effects of reward contingency and performance feedback on intrinsic motivation. Journal of Personality and Social Psychology, 1979, 37, 1352-1363.

Harter, S. Developmental differences in the manifestation of mastery motivation on problem-solving tasks. Child Development, 1975, 46, 370-378.

Harter, S. Pleasure derived from challenge and the effects of receiving grades on children's difficulty level choices. Child Development, 1978, 49, 788-798.

Hughes, B.J. Evaluation condition, sex of subject, and task difficulty as factors in continuing motivation. Unpublished doctoral dissertation, Arizona State University, 1982.

Kulik, J.A., Kulik, C.C., & Cohen, P.A. Effectiveness of computer-based college teaching: A meta-analysis of findings. Review of Educational Research, 1980, 50, 525-544.

Magidson, E.M. One more time: CAI is not dehumanizing. Audiovisual Instruction, 1977, 22, 20-21.

Morsley, M.L., Teacher comments and continuing motivation. Unpublished doctoral dissertation, Arizona State University, 1983.

Sarafino, E.P., & Stinger, M.A. Developmental factors in the undermining effect of extrinsic rewards on intrinsic interest: Do young children overjustify? The Journal of Genetic Psychology, 1981, 138 291-299.

Swenson, R.P., & Anderson, Chrys. The role of motivation in computer-assisted instruction. Creative Computing, 1982, 8, 134-138.

Swigger, K.M., Campbell, J., & Swigger, B.K. Preschool children's preferences of different types of CAI programs. Educational Computer Magazine, 1983, 38-40.

Tait, K. Hartley, J.R. & Anderson, R.C. Feedback procedures in computer-assisted arithmetic instruction. Journal of Educational Psychology, 1974, 43, 161-171.